FIG. 1

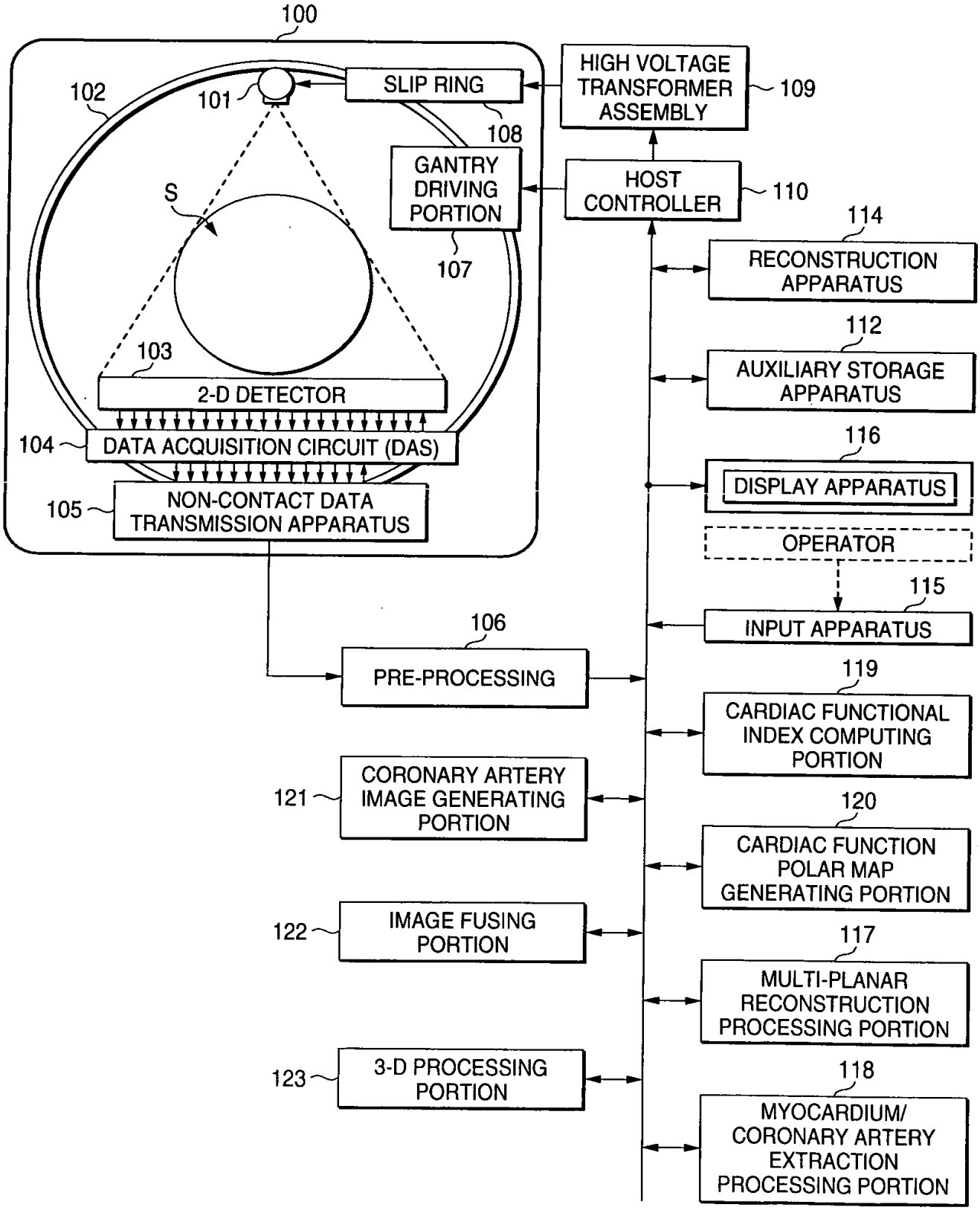
100
102
101
SLIP RING
108
HIGH VOLTAGE TRANSFORMER ASSEMBLY
109
GANTRY DRIVING PORTION
107
HOST CONTROLLER
110
S
114
RECONSTRUCTION APPARATUS
112
AUXILIARY STORAGE APPARATUS
103
2-D DETECTOR
116
DISPLAY APPARATUS
104
DATA ACQUISITION CIRCUIT (DAS)
OPERATOR
115
INPUT APPARATUS
105
NON-CONTACT DATA TRANSMISSION APPARATUS
106
PRE-PROCESSING
119
CARDIAC FUNCTIONAL INDEX COMPUTING PORTION
121
CORONARY ARTERY IMAGE GENERATING PORTION
120
CARDIAC FUNCTION POLAR MAP GENERATING PORTION
122
IMAGE FUSING PORTION
117
MULTI-PLANAR RECONSTRUCTION PROCESSING PORTION
123
3-D PROCESSING PORTION
118
MYOCARDIUM/ CORONARY ARTERY EXTRACTION PROCESSING PORTION

FIG. 2

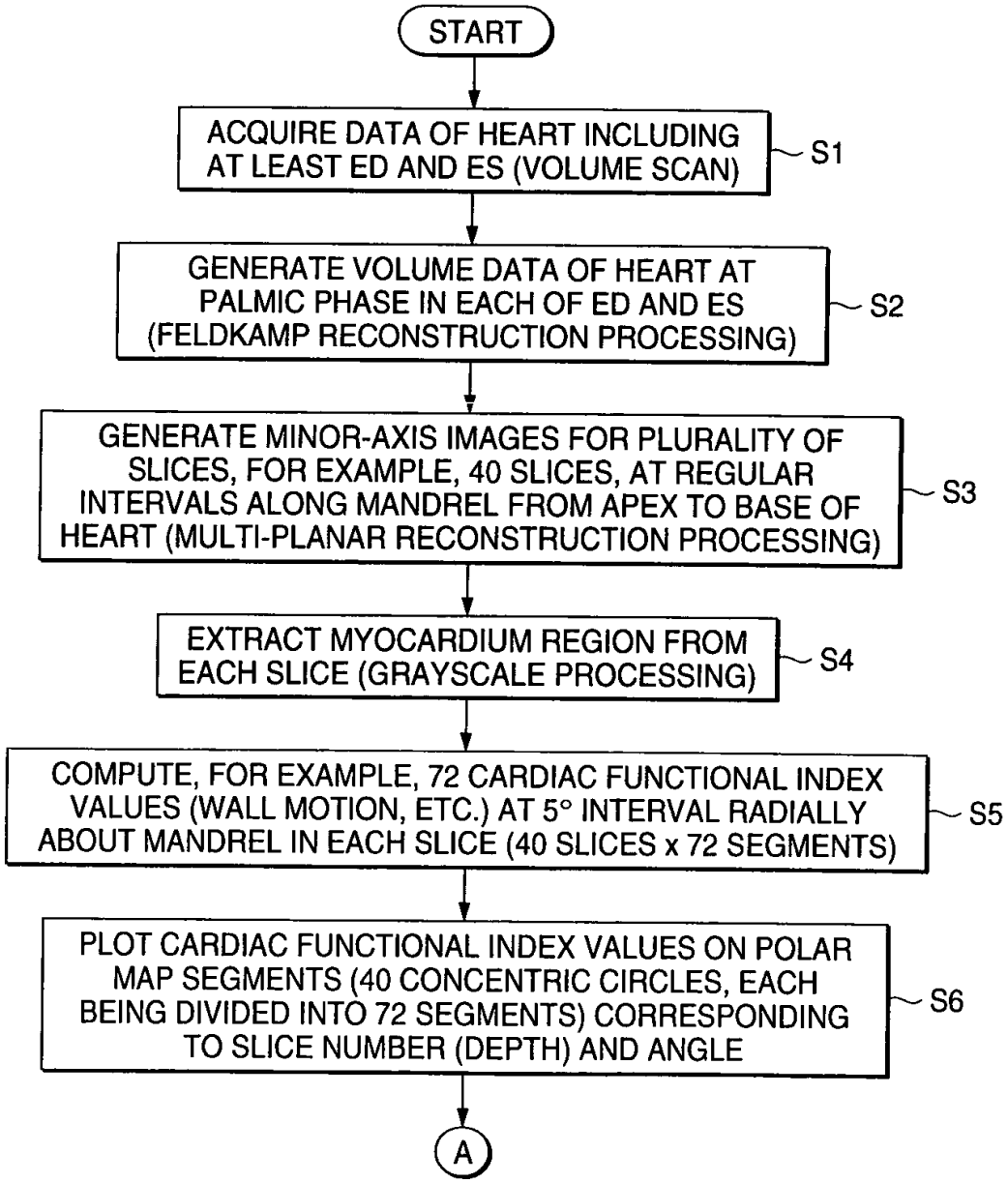
START
ACQUIRE DATA OF HEART INCLUDING AT LEAST ED AND ES (VOLUME SCAN)
S1
GENERATE VOLUME DATA OF HEART AT PALMIC PHASE IN EACH OF ED AND ES (FELDKAMP RECONSTRUCTION PROCESSING)
S2
GENERATE MINOR-AXIS IMAGES FOR PLURALITY OF SLICES, FOR EXAMPLE, 40 SLICES, AT REGULAR INTERVALS ALONG MANDREL FROM APEX TO BASE OF HEART (MULTI-PLANAR RECONSTRUCTION PROCESSING)
S3
EXTRACT MYOCARDIUM REGION FROM EACH SLICE (GRAYSCALE PROCESSING)
S4
COMPUTE, FOR EXAMPLE, 72 CARDIAC FUNCTIONAL INDEX VALUES (WALL MOTION, ETC.) AT 5° INTERVAL RADIALLY ABOUT MANDREL IN EACH SLICE (40 SLICES x 72 SEGMENTS)
S5
PLOT CARDIAC FUNCTIONAL INDEX VALUES ON POLAR MAP SEGMENTS (40 CONCENTRIC CIRCLES, EACH BEING DIVIDED INTO 72 SEGMENTS) CORRESPONDING TO SLICE NUMBER (DEPTH) AND ANGLE
S6
A

FIG. 3

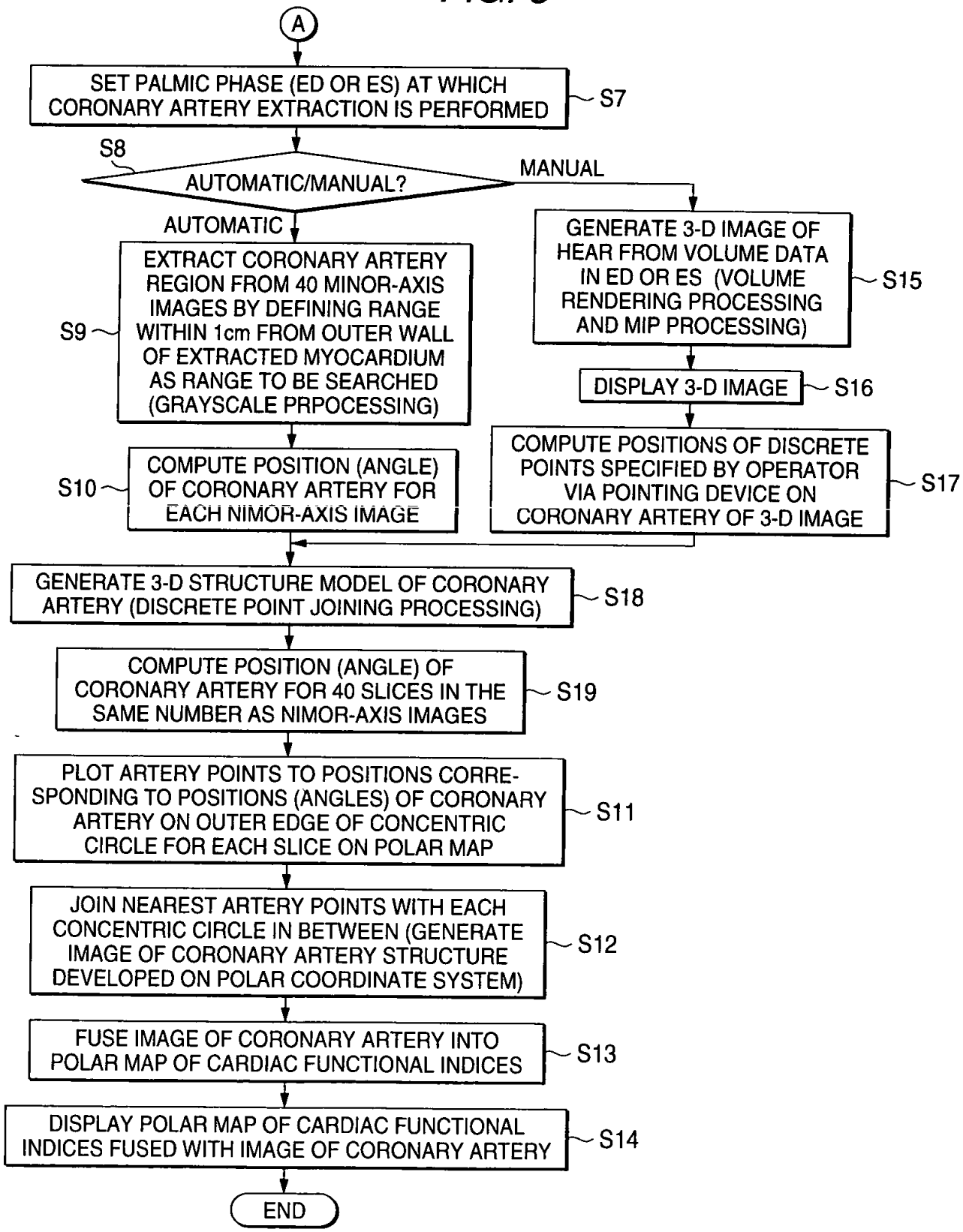
A
SET PALMIC PHASE (ED OR ES) AT WHICH CORONARY ARTERY EXTRACTION IS PERFORMED
S7
S8
AUTOMATIC/MANUAL?
MANUAL
AUTOMATIC
EXTRACT CORONARY ARTERY REGION FROM 40 MINOR-AXIS IMAGES BY DEFINING RANGE WITHIN 1cm FROM OUTER WALL OF EXTRACTED MYOCARDIUM AS RANGE TO BE SEARCHED (GRAYSCALE PRPOCESSING)
S9
GENERATE 3-D IMAGE OF HEAR FROM VOLUME DATA IN ED OR ES (VOLUME RENDERING PROCESSING AND MIP PROCESSING)
S15
DISPLAY 3-D IMAGE
S16
COMPUTE POSITION (ANGLE) OF CORONARY ARTERY FOR EACH NIMOR-AXIS IMAGE
S10
COMPUTE POSITIONS OF DISCRETE POINTS SPECIFIED BY OPERATOR VIA POINTING DEVICE ON CORONARY ARTERY OF 3-D IMAGE
S17
GENERATE 3-D STRUCTURE MODEL OF CORONARY ARTERY (DISCRETE POINT JOINING PROCESSING)
S18
COMPUTE POSITION (ANGLE) OF CORONARY ARTERY FOR 40 SLICES IN THE SAME NUMBER AS NIMOR-AXIS IMAGES
S19
PLOT ARTERY POINTS TO POSITIONS CORRE-SPONDING TO POSITIONS (ANGLES) OF CORONARY ARTERY ON OUTER EDGE OF CONCENTRIC CIRCLE FOR EACH SLICE ON POLAR MAP
S11
JOIN NEAREST ARTERY POINTS WITH EACH CONCENTRIC CIRCLE IN BETWEEN (GENERATE IMAGE OF CORONARY ARTERY STRUCTURE DEVELOPED ON POLAR COORDINATE SYSTEM)
S12
FUSE IMAGE OF CORONARY ARTERY INTO POLAR MAP OF CARDIAC FUNCTIONAL INDICES
S13
DISPLAY POLAR MAP OF CARDIAC FUNCTIONAL INDICES FUSED WITH IMAGE OF CORONARY ARTERY
S14
END

FIG. 4

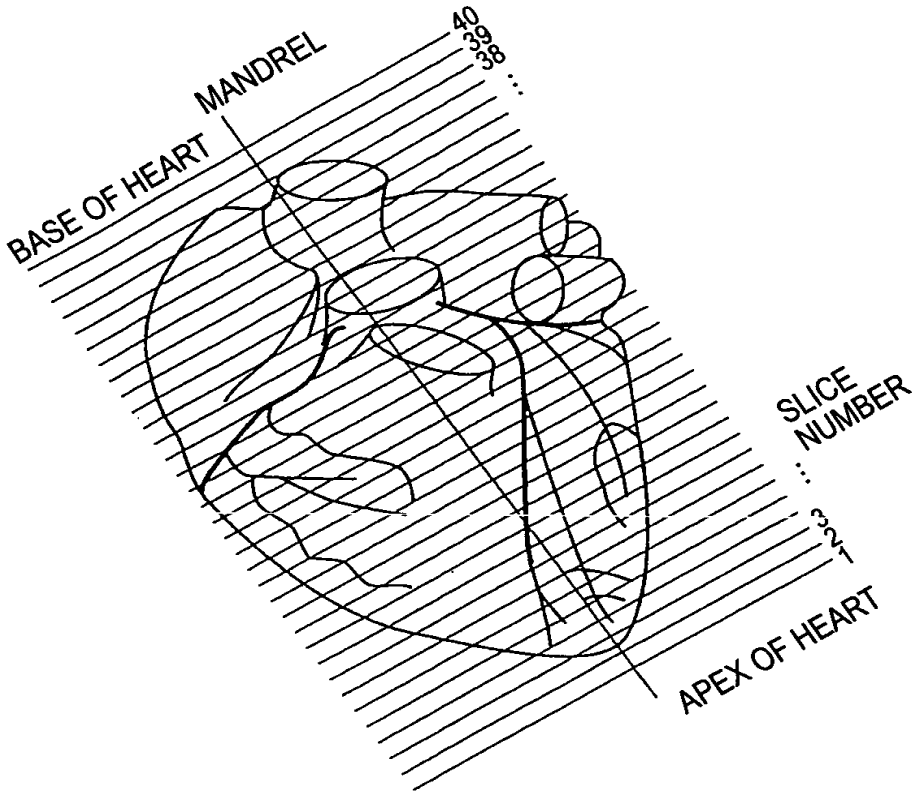
MANDREL
BASE OF HEART
40
39
38
SLICE NUMBER
3
2
1
APEX OF HEART

FIG. 5

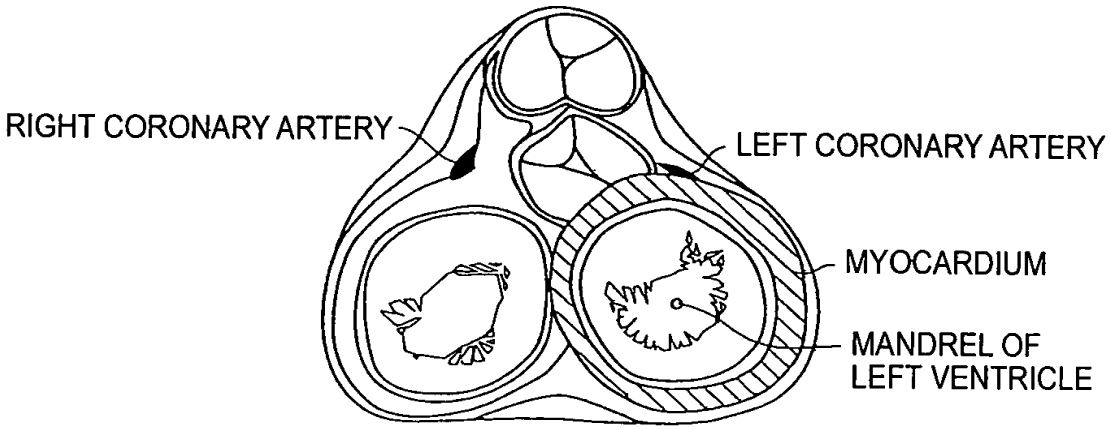
RIGHT CORONARY ARTERY
LEFT CORONARY ARTERY
MYOCARDIUM
MANDREL OF LEFT VENTRICLE

FIG. 6

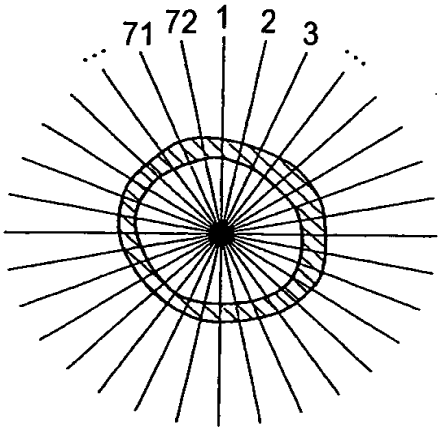
71
72
1
2
3

FIG. 7

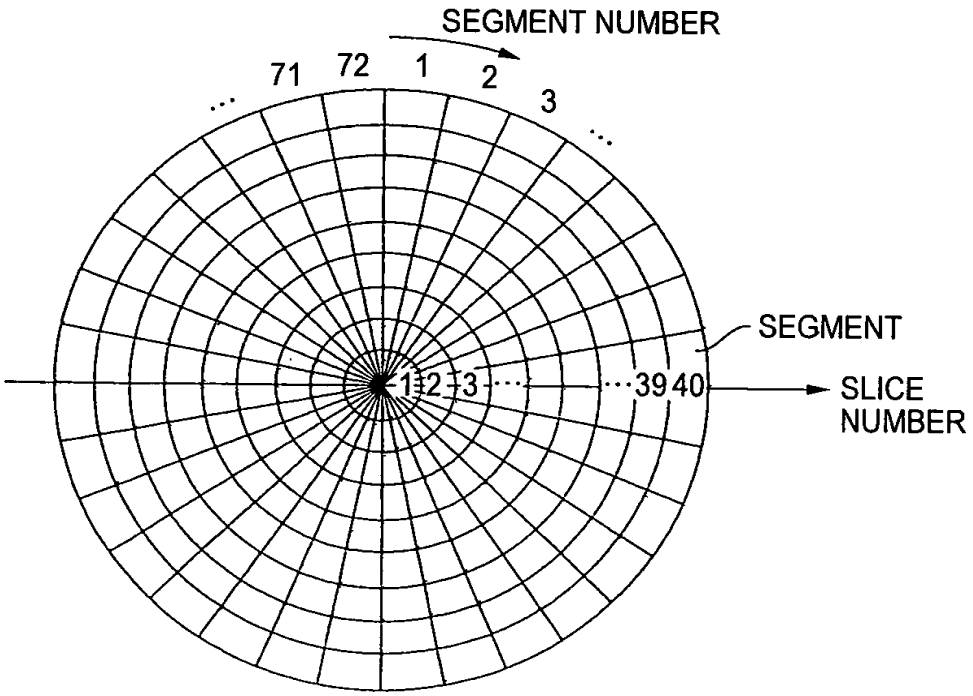
SEGMENT NUMBER
71
72
1
2
3
SEGMENT
1
2
3
39
40
SLICE NUMBER

FIG. 8

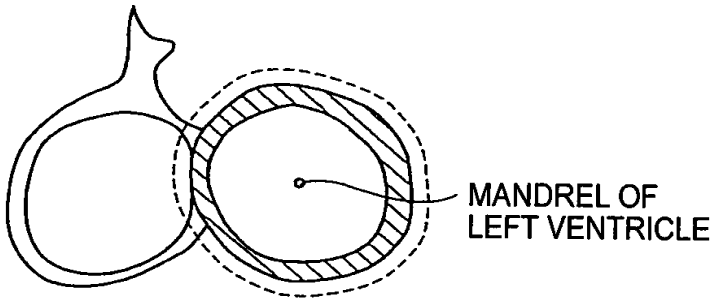
MANDREL OF
LEFT VENTRICLE

FIG. 9

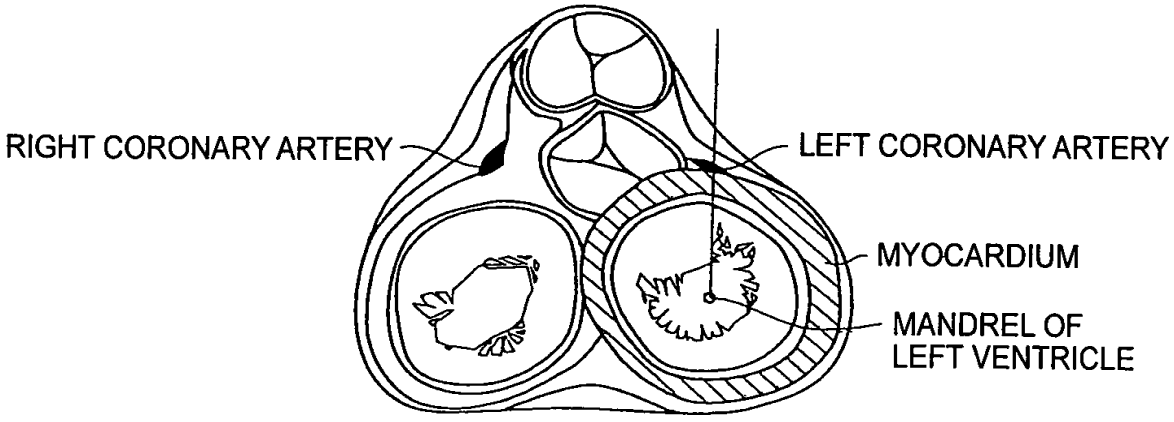
RIGHT CORONARY ARTERY
LEFT CORONARY ARTERY
MYOCARDIUM
MANDREL OF
LEFT VENTRICLE

FIG. 10

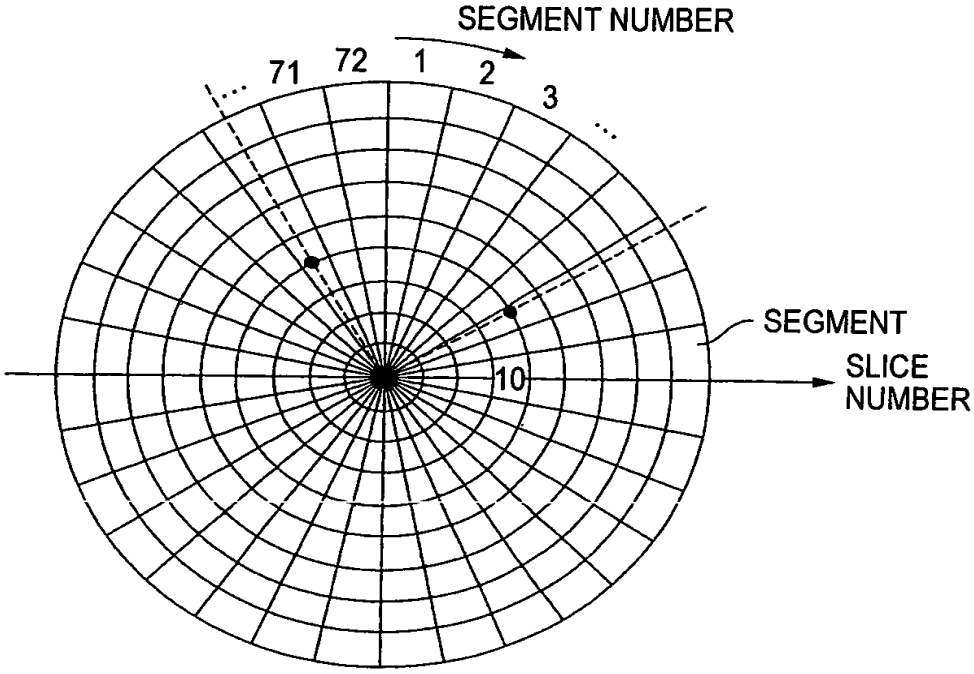

FIG. 11

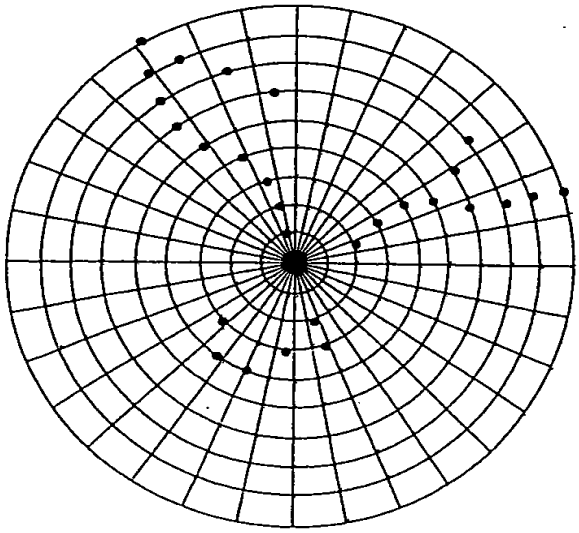

FIG. 12

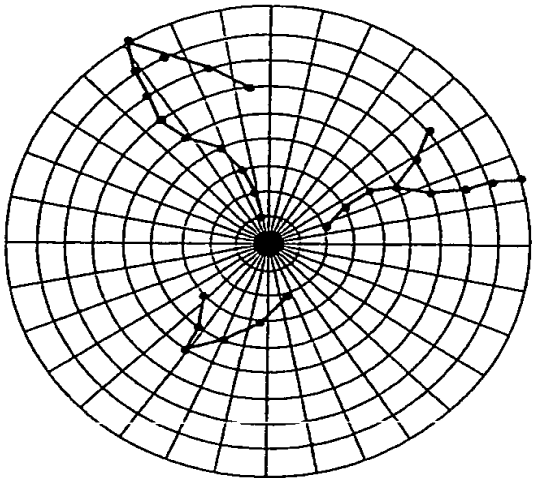

FIG. 13

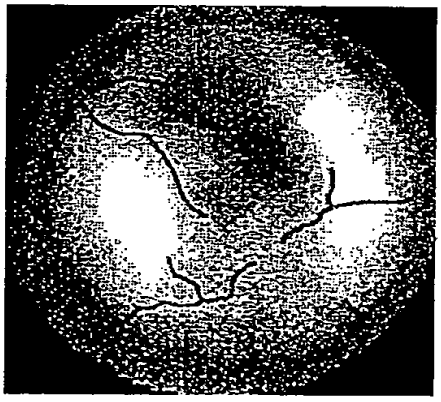

FIG. 14

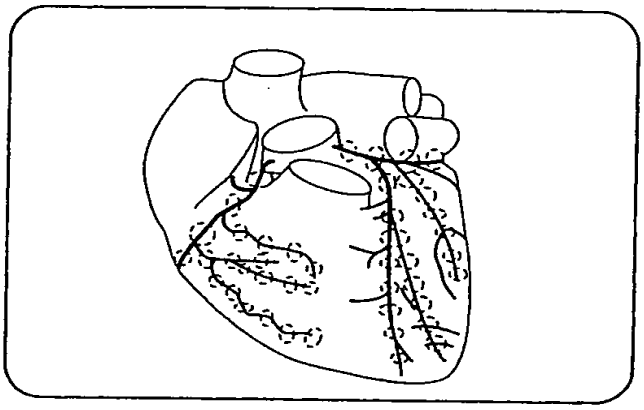

FIG. 15

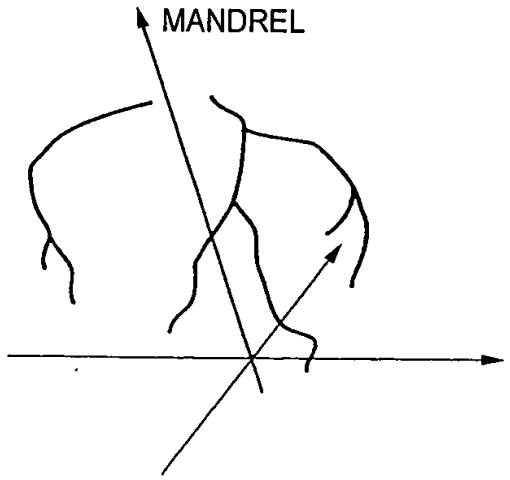

FIG. 16

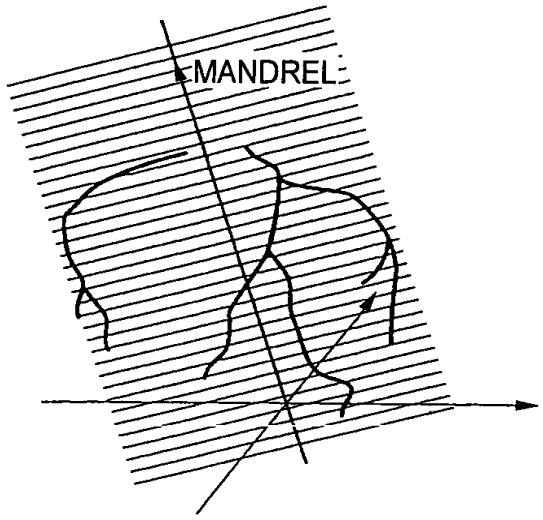

FIG. 17

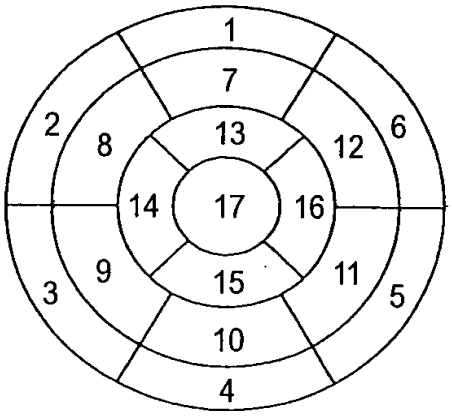

FIG. 18A

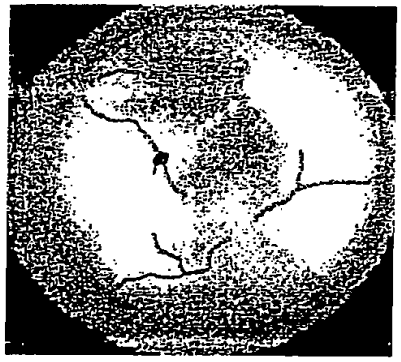

FIG. 18B

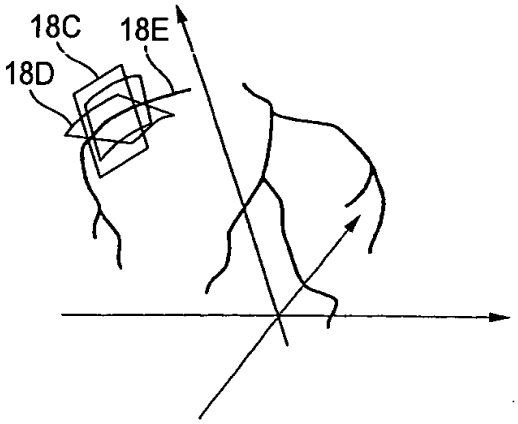

FIG. 18C

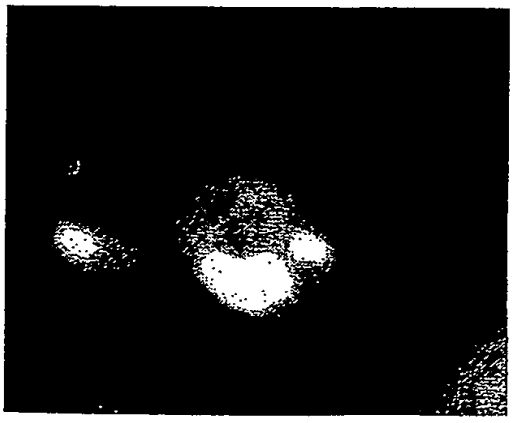

FIG. 18D

FIG. 18E

FIG. 19C

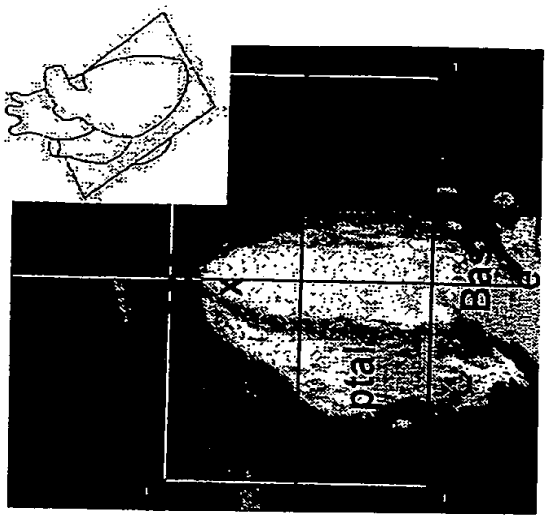

FIG. 19B

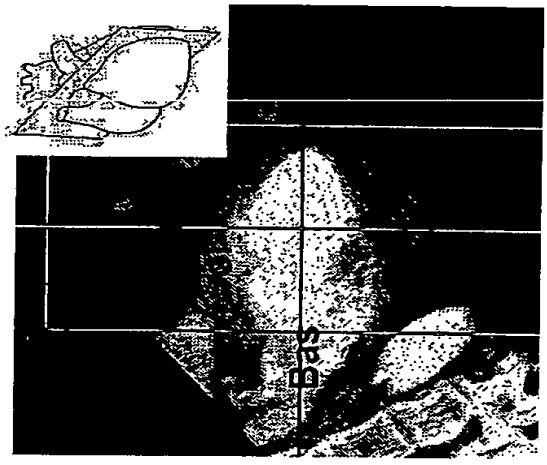

FIG. 19A

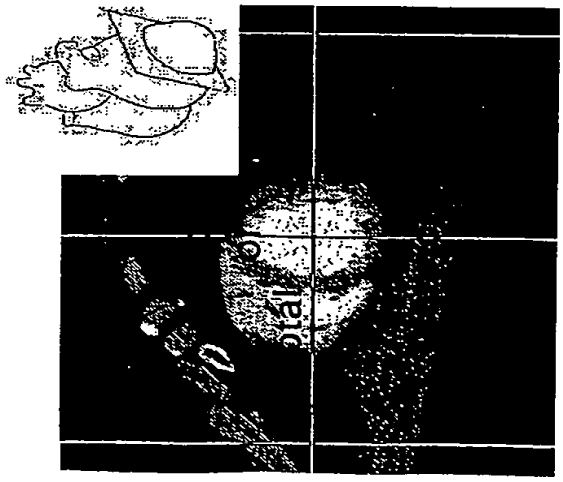
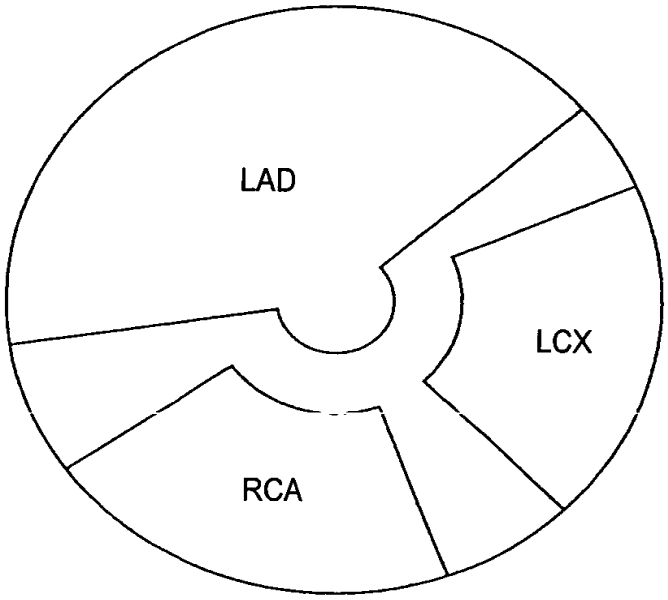
FIG. 20